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SOME OBSERVATIONS ON THE USE OF PENICILLIN IN COLLIERY HORSES

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The draught horse has largely disappeared from Britain and the majority of those still in use are employed beneath the surface of the land. Moreover, the number used underground is diminishing, and ere this equine disappears altogether to become a subject for nostalgic reflection, the writer would like to record the usefulness of penicillin in underground horses, more particularly because little information relating to the efficacy of penicillin in horses is available.

The types of cases met with in underground work are various, and until the introduction of penicillin certainly caused some anxiety, more particularly those associated with the foot, pastern, fetlock and the hip. Railroads underground generally, rest on relatively soft ground or at any rate, due to the constant fall of coal dust they become fairly soft ; with frequent travelling by men and horses a concavity or depression, anything from 1 or 2 to 6 or 8 inches deep, forms between the rail sleepers. (It is a part of our duties when such circumstances are reported to us to point out that these depressions should be filled in.) In this way the sleepers become exposed and it follows that the fetlock and pastern commonly strike the sleepers, and become contused and enlarged ; in most cases, of course, resolution follows after rest and treatment by application of cold or hot water. The odd case crops up, however, wherein the contusion does not subside, but swelling progresses above the fetlock joint ; if resolution does not follow at this stage, then later a somewhat large and hard joint is formed, with the development of a small suppurating focus. Incision of the affected part does not always bring permanent relief, and it is in these stubborn cases that penicillin therapy has proved effective.

Injuries to the foot are numerous and the causes are chiefly road nails with ½-inch-square head, 3 or 4 inches long, tapering to a point, brattice nails, odd bits of wire and sharp points of various mining equipment and, of course, faulty shoeing. Generally the larger the nail the less likelihood there is of subsequent suppuration, for on account of its size, the aperture it leaves is sufficient to enable one to insert the tapering nozzle of a wound syringe into the cavity for flushing and drainage. The brattice nail, too, was a big offender in the past ; measuring about 1 inch long, it was often dropped by workmen, and on account of its flat head frequently stood upright on the ground ; when picked up by a passing horse the navicular bursa was often pierced, giving rise to a persistent purulent discharge accompanying the bursal fluid. To-day, happily, these nails are now fashioned with an oval head and as they cannot stand upright on the ground, accidents from this source have diminished considerably.

As practitioners well know, the majority of foot cases, whatever the cause, heal up fairly readily, but it is the odd stubborn type which gives rise to anxiety. Paring the foot certainly releases the enclosed pus *at the site*, but it was not uncommon to find that with persistent lameness of the foot, a high temperature and inappetence were features ever present in these cases, despite drainage. Thus, instead of resolution, an ascending type of suppuration occurred, resulting in swelling of the pastern and fetlock, and sometimes extending even beyond these regions. The usual treatment in all stages was close clipping of the hair, constant bathing in hot water by day and the application of a kaolin type of poultice overnight. If resolution did not occur at this stage, small suppurating foci broke out around the enlarged pastern and fetlock at various times, with no common connecting channel between any two foci. Incision of any one small abscess merely expelled a localised collection of pus and in a few days another incision could be made at another point, only to repeat the same futile operation in yet a few more days. In these cases, too, the exhibition of penicillin has been followed by rapid and complete recovery. It is true that the vast majority of these cases did heal up but were protracted, tedious, wasting a great deal of time and labour ; moreover, whilst lameness disappeared, the enlarged joint was present for life. This is often the case in colliery horses where injured pasterns and fetlocks are involved (whether there is suppuration or not, *i.e.*, an enlarged joint unassociated with lameness).

Injuries to the lateral cartilages and subsequent development of " quittor " have not been common in the writer's experience, but a few cases have occurred and the majority responded to penicillin therapy.

Practitioners familiar with underground conditions will appreciate that whilst normally there is sufficient room for a horse and man to turn around in a roadway, it is not always possible to observe a broken steel girder or length of timber projecting from the sides or roof of the roadway they are meant to support. Accidents occur from this source ; on occasions these are very severe, involving the head, shoulders and hips. (It is not intended that this paper should include a description of general underground conditions but it is just as well to point out that when the head is involved an otherwise docile animal can turn out to be an extremely dangerous worker, and has then to be dispensed with.) Of this type of accident it is the hip which is usually most troublesome ; here the external angle of the ilium, being the most prominent part of the hind limbs, strikes the offending object and a tear in the skin and the subcutaneous tissues may suggest that the accident is only superficial. However, frequently further exploration reveals small spicules of fractured ilium. Resolution soon follows when all the spicules are removed ; otherwise, due to constant muscular movement, they can and do migrate to various parts of the body—downwards towards the stifle and upwards and forwards towards the lumbar muscles, where the familiar features of multiple and independent suppurating foci again appear. In these cases even when the spicule or spicules have been located, resolution does not necessarily follow immediately. Here again penicillin therapy has been successful.

Here one may interpolate an illustration of the fact that these migrating spicules can be an expensive matter. On one occasion, before we had access to penicillin, a small spicule—less than the size of an oat seed—eluded capture

soon after the accident and for the next six months, partial resolution alternated with successive incisions and explorations at various points on the rump. As these suppurating foci seemed to appear with undiminished but harassing regularity, the prospects of further useful employment seemed to recede and the horse was then destroyed. On *post-mortem* examination a large encapsulated mass of pus about the size of an average grapefruit was seen in the depths of the lumbar muscles, with the offending spicule reposing therein.

Accidents with the runaway horse and from the runaway tram (or tub) are still met with. The result—if not fatal—is a sanguinary affair but does not call for any special comment, save that, due to the presence of coal dust, stone and chippings of torn timber, suturing is, in the main, pointless, for the lacerated subcutaneous tissue and muscles contain considerable quantities of these foreign particles, often difficult to observe. The writer's experience has been that better results are produced by frequent flushing with mild antiseptic solution aided by application of penicillin from an intramammary tube.

The shoulder, forearm, knee, stifle and hock are frequent sites of extensive but apparently woundless contusions ; large swellings are soon observed all over the body but usually subside with cold or hot water treatment. If suppuration occurs, then penicillin therapy is introduced.

Equine pneumonia, whether complicated by pleurisy or not, is not a matter for easy diagnosis, probably due to the fact that our horses have a liberal covering of subcutaneous adipose tissue, thus rendering auscultation difficult. However, when it is suspected penicillin is the best agent to be employed alone or synergistically with sulphanilamide.

Comments

It was not until the end of 1946 that we were able to obtain the sodium salt of penicillin in any appreciable quantity. With no means of assessing or computing the necessary dose for a horse, it was soon found that one of 500,000 units given intramuscularly every four hours was totally ineffective and thus it was raised to various strengths until encouraging results were achieved with a dosage of 2,000,000 units every four hours. In severe cases the initial dose is 3,000,000 to 4,000,000 units. But repeated doses meant nightly administration or at least heavy doses late in the evenings. It was therefore with considerable hope and ultimate relief that in 1950 we decided to use " Distaquaine " (fortified) ; with its slow releasing procaine content the blood level was maintained sufficiently long until injection of the sodium salt could be repeated on the following day.

Our results have been so encouraging during the last year or so that we now follow a fairly fixed routine in suitable cases : the sodium salt by day at four-hourly intervals to be sustained overnight with distaquaine in doses of about 4·8 mega units. In most cases a course of three to four days is sufficient.

From the foregoing notes it will be readily seen that previously a considerable amount of time and energy was monotonously dissipated in attempting to combat infection and suppuration with varied results. The introduction of penicillin therapy and its regular use when necessary has altered the whole approach to equine complaints. Whilst there is a danger of indiscriminate use and of accepting this agent as a panacea for all of our problems, it has a definite place in equine therapeutics and doubtless will retain it until its efficacy has been superseded by more potent and advantageous antibiotics.

SEASONAL VARIATIONS IN THE BLOOD PICTURE OF NIGERIAN CATTLE

BY

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The occurrence of a seasonal anaemia (*sic*) in young cattle kept for experimental purposes at the Veterinary Research Laboratory, Vom, Northern Nigeria, was first described by Unsworth (1948). He recorded that " the haemoglobin content (of the blood) in g. per 100 ml. reached the low average value of 6·1 to 6·5 during July, August, September and October (1948), subsequently increasing to an average of 9·6 g. during March, 1949." Unsworth concluded that the anaemia was not parasitic in origin as " the tick burden remained low or absent throughout " and, further, " animals showing a persistently low faecal egg count exhibited a decline in haemoglobin value equivalent to that shown by animals with a high egg count." Another feature of the condition was that " the animals did not grow well throughout the period although some gain did occur during the wet season." Unsworth thought that the condition might be due to a " decrease of minerals " in the pasture at this time of year. The possibility of association of the anaemia with a mineral deficiency was studied by Garner (1950a). The purpose of the present paper is to give an account of the haematological variations and pathological findings during two wet seasons and to describe the results of attempts to reduce or suppress these changes by administration of various dietary supplements.

Haematology

Variations in the haemoglobin concentration, red cell count, mean corpuscular haemoglobin concentration (MCHC) and mean cell volume (MCV) of the same 12 cattle as used by Unsworth in his original work, for the period June, 1948, to January, 1950, inclusive, are shown in Fig. 1.

The animals were young Zebu bulls aged 18 months to two years at the beginning of the work. They were kept under range conditions and, except for short periods in 1949 (see below), received no supplements of any kind. Daily examinations were made of blood smears in order to avoid possible complications arising from a concurrent anaemia due to blood protozoa. Blood for the various determinations was taken from the jugular vein, all samples being obtained between 7 and 8 a.m. Standard procedures were employed, haemoglobin being determined by an acid haematin method using a Klett colorimeter fitted with a Newcomer disc. The monthly figures given are averages for weekly results.

No haematological standards are available for West African cattle. For the purpose of this investigation the assumption was therefore made that the blood picture could be considered " normal " when the haemoglobin content and erythrocyte count were maximal. As the MCV was greatest when the haemoglobin and red cell figures were almost at their minima, the tentative conclusion was drawn that the condition might

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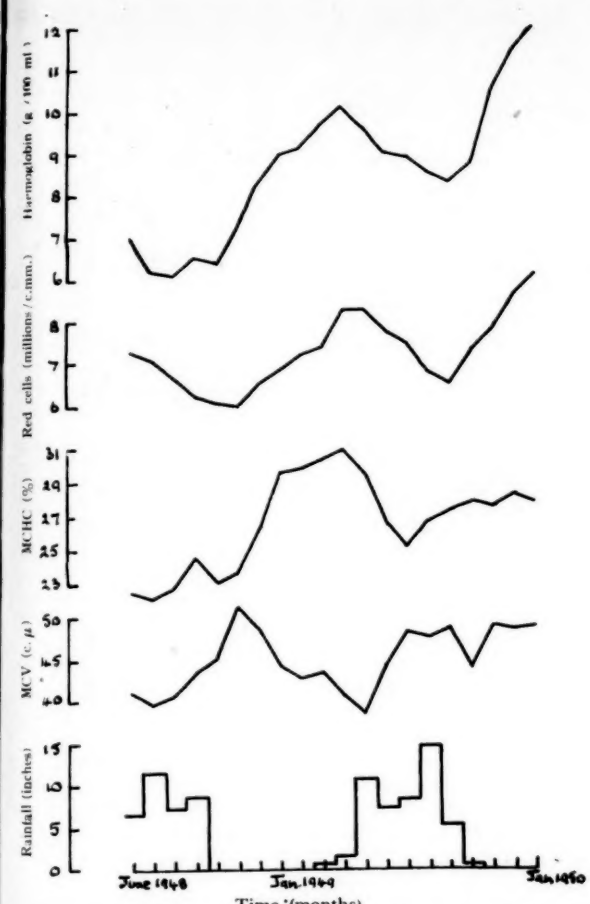

FIG. 1.—Variations in haemoglobin concentration, red cell count, mean corpuscular haemoglobin concentration and mean cell volume of cattle and in rainfall over the period June, 1948, to January, 1950.

be classified as a macrocytic hypochromic anaemia. The degree of macrocytosis and, to a less extent, of hypochromia, varied considerably between individuals. Variations in MCHC and MCV during the 1949-50 wet season were much less marked than during the corresponding periods of 1948 and 1949.

Recent work by Fiennes (1952) has cast doubt on the significance of minor changes in red cell count and cell size. Consideration of these findings in relation to the present work will be deferred until the discussion.

Only a few observations were made on the white cells. These indicated little if any change other than a larger percentage of eosinophils than is usually considered normal for cattle. Bell & Irwin (1938) have reported similar findings in apparently healthy cattle.

An extension of the observations to other laboratory cattle and to animals from a local Fulani herd revealed that all those examined were subject to similar variations although these were less marked in older animals.

Pathology

Examinations were made *post-mortem* on two of the original group of animals and on other cattle when the haemoglobin values were minimal. The only constant feature noted was a relative sparcity of red bone marrow. The marrow presented a normal histological appearance apart from a predominance of eosinophils. Liver sections from these and other cattle kept in the same area were found to show only minor changes which were considered unlikely to have much functional significance. Worm counts were also made and in all cases there were either no worms or very few.

Aetiology

The low haemoglobin values encountered during 1948 seemed to indicate a pathological rather than a physiological aetiology (but see Discussion below). The seasonal occurrence, the fact that the variations followed a parallel course in all the animals examined, the character of the haematological changes and the absence of parasites from blood smears would appear to eliminate the possibility of an infection. Further, determination of serum bilirubin and semi-quantitative estimation of urinary and faecal urobilin revealed no variation paralleling the changes in haemoglobin concentration, thus indicating that no intensification of blood pigment breakdown occurred.

Intestinal Parasites.—Intestinal parasites, as mentioned above and also as indicated by faecal egg counts, were never present in large numbers, and Unsworth's contention that the condition was not due to helminthiasis was further substantiated by the lack of response to the administration of 50 g. of phenothiazine in three animals.

Mineral Deficiency or Excess.—Although, as indicated above, there may be some doubt of the significance of changes in MCV, there could be no doubt that the red cells were hypochromic. Hypochromia is associated with a deficiency of one or more of the factors concerned with haemoglobin synthesis, usually iron. For this and other reasons, of which the most important was the striking similarity between the seasonal incidence of the condition and that of "falling disease" or "sudden death" observed in South-Western Australia, attention was first directed to the possibility of a mineral deficiency as the primary factor. However, as reported by Garner (1950a), no evidence for the implication of a deficiency of iron, copper or cobalt, or an excess of manganese or molybdenum in the aetiology of the condition could be obtained.

In May, 1949, arrangements were made to examine cattle at the Livestock Improvement Centre (L.I.C.), Vom. These animals had received supplements, including guinea-corn, palm-kernel cake, ground-nut cake and some maize silage, from birth, and some, in the early stage of lactation, were receiving a proprietary brand of mineral supplement. This was designed to supply all the commoner minerals essential to the ruminant (Ca, P, Na, Cl, I, Fe, Cu, Co and Mn). Ten of these animals were taken on to the experiment, together with 10 in the same phase of lactation, but receiving no mineral supplement, to serve as controls. A further 10 animals of approximately the same age, but at the end of their lactation, were also examined in case the stresses of milk production should complicate any anaemia which might occur. There was no difference in haemoglobin levels and red cell counts between the different groups of L.I.C. animals; these were, however, consistently higher than the figures for laboratory cattle (Fig. 2). An upward trend is apparent from May, 1949, to January, 1950, when the work had to be abandoned. This may indicate some physiological variation in these animals.

The difference between the results obtained with L.I.C. cattle and the earlier experimental animals was evidently due to factors other than the mineral supplement.

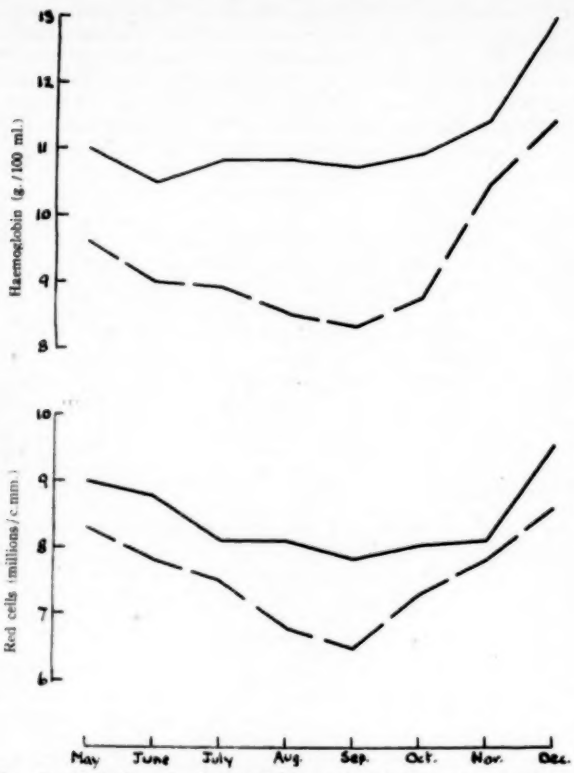

FIG. 2.—Variations in haemoglobin and red cell count in L.I.C. cattle (continuous line) and laboratory cattle (broken line) during May to December, 1949.

Protein Deficiency.—A possible inference from the above results was that the diet of the laboratory cattle was deficient in protein for, as noted above, L.I.C. animals received a full protein supplement from birth, whereas laboratory cattle received no supplements whatsoever.

The type of anaemia resulting from a deficiency of protein in the diet depends on the possible coincident existence of other deficiencies, but is usually macrocytic. Protein deficiency is also accompanied by hypoproteinaemia, the albumin fraction particularly being affected.

Total and differential serum protein values for laboratory animals with low haemoglobin levels and for a small number of L.I.C. bulls of approximately the same age (*vide* Garner, 1950b) are given in Table I. Blood samples were taken for protein analysis from August to October, 1949. The albumin and globulin levels in the laboratory animals are significantly lower and higher respectively than the corresponding figures for cattle on an adequate plane of nutrition.

TABLE I
TOTAL AND DIFFERENTIAL SERUM PROTEIN VALUES FOR LABORATORY CATTLE AND FOR BULLS OF COMPARABLE AGE FROM THE LIVESTOCK IMPROVEMENT CENTRE, VOM

	Laboratory cattle (12)	L.I.C. bulls (9)
Total protein (g. per 100 ml.)	7·70 ± 0·670	8·81 ± 0·884
Albumin (g. per 100 ml.)	3·45 ± 0·521	4·28 ± 0·658
Globulin (g. per 100 ml.)	5·25 ± 0·679	4·52 ± 0·572

In September, 1949, three animals were given protein supplements in the form of ground-nut cake, at first at the rate of 1½ lb. per head daily and, when this produced no response, at the rate of 3 lb. per head daily. No improvement in condition was observed.

Other Possible Deficiencies.—The possibility was considered that some disturbance in the ruminal flora might interfere with synthesis of vitamins or other substances essential for erythropoiesis. The only member of such a group of compounds available at that time was thiamine. As a vitamin B_1 deficiency is associated with a rise in the blood pyruvate concentration, it was thought that a reduction in blood pyruvate following injection of B_1 might serve as an indicator of the existence, not only of a thiamine deficiency, but also of a general lack of B vitamins if such a deficiency were due to abnormalities in the ruminal flora. Although a fall was observed in three animals given 250 mg. of thiamine hydrochloride subcutaneously this was not significant when compared with the results in three control animals.

The effect of dosing with fresh raw liver was then tried. Livers were obtained from L.I.C. cattle slaughtered for meat. One animal was given 1 lb. of liver by mouth daily for seven days and a second a single dose of 11 lb. The purpose of the large single dose was to endeavour to allow for the possible destruction of an essential constituent by ruminal organisms before the pulped liver reached the abomasum. In neither case was the blood picture altered.

A Toxic Factor in the Herbage.—Since laboratory and L.I.C. stock grazed contiguous pastures of similar composition, there can be little doubt that no toxic factor associated with a particular pasture was involved.

DISCUSSION

The first question to be decided is whether the condition can be regarded as " physiological " or " pathological."

Seasonal variations in haemoglobin and red cell levels have been described in Indian cattle (Pal, Momin & Mullick, 1945), the lowest values being found during November, December and January, but the changes recorded were much less well-marked than in the West African Zebus used in the present work. Rusoff, Frye & Scott (1951) could find no evidence of such variations in Sindhi-Jersey crosses in the United States. The effect of the ambient temperature on haemoglobin concentration has received some attention but again the reports are conflicting. According to Manresa, Reyes, Gomez, Zialcita & Falcon (1940) and Bonsma, Scholtz & Badenhorst (1940), higher air temperatures are associated with lower haemoglobin values. Akopjan (1941), on the other hand, reported a direct relationship between haemoglobin concentration and the environmental temperature. Fiennes (1952) found little diurnal variation in the haemoglobin content, while Brody (1949) reported that the ambient temperature had no significant effect. It therefore seems unlikely that the low haemoglobin values encountered during the wet seasons of both 1948 and 1949 were associated with seasonal changes in temperature and/or humidity.

There can be less certainty with regard to the other haematological measurements. Holman (1952), for example, has shown that a compensatory mechanism exists in healthy cattle by which animals with a low red cell count have corpuscles above average size and *vice versa*. It is therefore doubtful if the term " macrocytosis " can be legitimately applied to the condition. Fiennes (1952) has reported considerable diurnal variations in the plasma specific gravity, red cell count, MCHC and MCV of Zebu-European crosses in Kenya associated with dilution of the plasma with fluid. From the close correlation observed between the changes in blood

components and the rainfall (Fig. 1), and further from the fact that similar but less pronounced variations were observed in L.I.C. cattle on a high plane of nutrition, it seems highly probable that the relatively less well-marked changes in MCV and erythrocyte count could be explained, in part, by a dilution effect of this kind associated with a higher water intake.

It is felt that such a physiological factor could have played only a minor part in the development of the very low haemoglobin and red cell levels encountered in 1948 for the following reason. The seasonal variations in both haemoglobin content and number of red cells appear to be superimposed upon a general upward trend. But there is ample evidence to show that the haemoglobin concentration is normally highest in young animals and falls with advancing age (Mullick & Pal, 1944 ; Duckworth & Rattray, 1948 ; Reda, 1951) ; this is accompanied by a much more pronounced fall in the erythrocyte count (Reda, 1951). The inference appears inescapable that in the young Zebu cattle examined in 1948, both haemoglobin synthesis and production of the red cell stroma was in some way retarded.

The aetiology of the condition is still uncertain. From the experimental results set out above it may be concluded with some confidence that the variations in the formed components of the blood are not associated with parasitic infestation, with the presence of some toxic principle in the herbage or with a dietary deficiency of iron, copper or cobalt. It is also unlikely that a deficiency of B vitamins is directly implicated. Although the administration of protein in the form of ground-nut cake had no apparent effect on the blood picture, the nature of the haematological findings and the associated hypoalbuminaemia are suggestive of a protein deficiency. The possibility that a specific amino-acid deficiency might be involved must be considered since it is known that the ground-nut proteins are relatively poor in the sulphur-containing amino-acids, particularly methionine (Cama & Morton, 1951).

A major difficulty in accepting any dietary deficiency as the primary factor lies in explaining why such a deficiency should be most evident during the wet season rather than in the dry season when the general plane of nutrition in cattle appears to be so much lower.

Summary

Variations occurring over the period June, 1948, to January, 1950, in the blood picture of a group of Zebu cattle kept under range conditions are described. At certain periods of the year these variations may be so pronounced as to induce an anaemia in young stock.

Reasons are given for believing that dilution of the blood may be a partial factor in producing the changes, but that other, non-physiological, factors are probably also involved.

The aetiology of the true anaemia encountered in young stock is not known. It is believed not to be parasitic in origin, due to a toxic factor in the herbage, to a mineral deficiency, or to a deficiency of B vitamins.

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RAPE OR COLE : SOME OBSERVATIONS ON ITS MANAGEMENT IN RELATION TO THE HEALTH OF SHEEP GRAZING ON IT

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The increased acreage of this crop during and following upon the war years has attracted greater attention to the method of layout and subsequent management : a subject that was of significance in previous years but receiving the same subdued interest then accorded to marginal and upland farming problems.

Brassica napus, rape or cole, has been described as a turnip without a swollen root, but possessing an elongated stem well covered with foliage. The leaves are smooth, but in the less common and smaller varieties are rough or turnip-like. As a heavy crop can be grown within three months of sowing it is favoured as a catch crop, to be sown after early potatoes, winter beans, or any early harvested cereal crop. In a fixed rotation on the better lowland soils, the full crop may be used as a root break after corn. With increasing reclamation of hill land, still greater use is being made of rape as a pioneer crop in the working down of the poorer turf and soil that in an impoverished state of fertility cannot support any other crop—this in preparation for the subsequent take of grass seed. Again, on a better class of land too inaccessible for harvesting operations, the crop is grown for subsequent feeding. It is also selected as a crop for good accommodation land far removed from the homestead.

Rape responds well to adequate manurial treatment which varies according to soil requirement, and with local custom. The general status of hill soil is one of very low lime and phosphate reserves, with potash generally at a favourable level. The stage in relation to cultivation at which the necessary corrective manurial application is made, varies. Agricultural opinion appears to be a little divided in this respect.

The full crop may be sown, that is rape seed alone, or undersown with rye-grass, or white turnip ; the latter may be incorporated where damage by pigeons is likely and thus affords some degree of insurance against complete failure. At a reduced rate of sowing it may be used as a cover crop for a permanent or long-term ley, in which case grazing takes place at an earlier stage than the period selected for the full crop.

It is the only crop that enables the marginal farm to fatten off store sheep for subsequent consignment to the grading

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centres, or as forward stores to the open market. Thus rape assumes great economic significance in the farming of marginal land, and in the pre-treatment of hill areas during the process of reclamation.

The crop is ready for grazing with cattle or sheep around a period of three months from sowing. The grazing may be uneventful or one accompanied by varying disorders, apparently associated with hitherto undetermined seasonal factors originating maybe in the animal or maybe in the plant. Thus, among wether lambs, surplus ewe lambs, wethers and unsound draft ewes that are put on to graze, perhaps the most common fatality recorded is "sudden death"; the enterotoxaemia group. Losses may be slight, under 1 per cent., or as great as 80 per cent. Where they are persistent the appropriate specific protective therapy is undertaken. The results are sometimes disappointing and deaths may continue. Other syndromes observed are photosensitisation, "blowing" or bloat, corneal opacity and unthriftiness. Temporary removal from the catch crop is then indicated.

When deaths have occurred among sheep of varying age groups folded together, some evidence has been obtained of a greater mortality among the younger sheep. Other instances have been observed in which a genetic factor appeared to be associated with the deaths and disorders; an uneven distribution being detected among hill sheep from different flocks and districts when placed together for feeding; and a proportionally higher death-rate among hill sheep than in cross-bred lambs folded with them.

The classical method of management is one of gradual introduction to this succulent food, increasing the daily period of grazing until it is assumed that complete tolerance has been acquired; this becomes part of the grazier's art, one of integrating the crop in terms of the animal, not the animal in terms of the crop. Such a method is not practised everywhere, and frequently sheep are turned on and remain until ready for drafting, without any apparent ill effects being observed.

Probably more varied is the layout in relation to folding. An investigation of the methods of management from north to south within the Principality has shown that two essentially different patterns are adopted; one in which the entire acreage is fenced out to the full crop, or one undersown; the other, including an area of old pasture as a run back.

The reasons for such difference in practice have been difficult to establish. In some districts this inclusion of an old pasture as a run off appeared as a traditional custom, no other method being considered. In other places it was accidental and the following year perhaps the sheep would be folded on a full crop of rape. One logical reason put forward in support of the inclusion of a run off was that for the first 10 days or so when first put on rape, hill sheep lose weight by refusing to eat more than a very little of the crop. The run off provides an alternative food supply until such time as the animals acquire a greater liking for this food, strange to them.

A group of farms on which persistent losses had occurred co-operated in a series of direct observations, on which the previous method of folding on a full crop was later modified to include an area of old pasture as a run back. Results for succeeding years showed a reduction in mortality. It was also observed that periods of alternate grazing on rape and on pasture occurred throughout the day. It was noted that, when previously folded on rape alone, herbage, along headlands, banks or areas left unploughed had been grazed bare, and equally punished were any of the edible parts of hedges that proved accessible.

The provision of old pasture along with rape may be easier under hill and marginal conditions than on the lowland. Up to the present the inclusion of old pasture has been favoured more than a young and productive sward. Considerable losses have been recorded among sheep folded on a full crop of rape with access to a young ley. Frequently these losses coincide with the onset of inclement weather. During prolonged periods of rain, the sodden conditions underfoot and the fleece saturated with water from rain-soaked leafage would appear to cause the loss of much energy in maintaining bodily heat. Yet another reason given for the run off was that it provided a drier bed, and an occasional observation has been made that it enabled the animals to clean their muddy feet on the grass. It surely will have been observed by many that the sheep prefer to make full use (as a camping ground) of any convenient dry bank or knoll within the rape enclosure rather than lie among the saturated leaves at night.

Experimental Work

Whilst direct observations suggested the advantage of a complementary area of old sward, no experimental data could be found relating to such a practice. A series of field experiments was set up in which (i) areas of rape and (ii) adjoining areas of rape with old pasture were stocked with sheep from similar sources; soil, drainage, cultivation, manurial treatment and aspect were controlled as accurately as possible. Although over 200 sheep were used no significant differences in morbidity or mortality were observed in 1949 and 1950. By derequisitioning of A.E.C. lands, further trials were stopped temporarily.

With the increasing tempo of hill reclamation further losses have been encountered among sheep grazing rape and old pasture; these were generally toward the end of the year. An apparent factor in these losses (from the aspect of management) was thought to be lack of adequate shelter during the inclement periods, a rather fundamental provision that had been overlooked.

Some farmers are of the opinion that lambs from hill flocks do not winter so well after they have been put on rape during the autumn. This does not appear to have been investigated experimentally.

In the Bulletin "Rations for Livestock" (1948) the theoretical requirements of a sheep weighing 80 lb. and gaining in live weight 2½ lb. per week are set out as :—

	Dry matter	Starch equivalent	Protein equivalent
	Lb.	Lb.	Lb.
	17·9	11·5	1·75
125 lb. of rape supplies	17·6	8·6	2·5

Thus rape provides a narrow nutritive ratio. From this theoretical consideration—apart from relieving monotony of diet—the inclusion of pasture, or the practice of undersowing, would at least assist in balancing the diet. Direct observation favours the old sward. Cote (1944), in his contribution on rape poisoning in cattle, advocates the inclusion of, or access to, an old sward, hay or straw. The fibre content for rape is quoted as 3·5 per cent. Is this sufficient?

Acknowledgments.—To Sir Thomas Dalling for sponsoring the field trials. To Denbighshire Agricultural Executive Committee for the loan of feeding sheep, and for the fencing out and setting up of experimental layouts of rape and rape with old pasture.

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CLINICAL COMMUNICATION

A CASE OF *SALMONELLA TYPHI-MURIUM* INFECTION IN CATTLE AND ITS ISOLATION FROM OTHER SOURCES

K. C. SELLERS AND W. B. V. SINCLAIR,
VETERINARY INVESTIGATION CENTRE, MINISTRY OF AGRICULTURE AND FISHERIES, LEEDS

The investigation described here records *Salmonella typhi-murium* infection in a small herd of cows and the isolation of the same organism from other animals on the farm and from the farm premises and sewerage systems.

The herd in question consisted of nine young Shorthorn cows, one of which suffered a mild attack of diarrhoea of three to four days' duration in August, 1951. *S. typhi-murium* was isolated from a sample of this cow's faeces. She was reaching the end of lactation and the illness caused complete cessation of milk secretion, followed, three weeks later, by the abortion of a seven-month foetus. Five days later a second cow which had shown no premonitory symptoms, aborted at eight months.

The herd was milked in a small shed opening on to a collecting yard where the cows congregated before and after milking. A duck and pig house opened on to the same yard and poultry were housed in a neighbouring stackyard and field. The poultry and ducks had free access to all the farm premises. The yard was dirty and the liquid effluent drained into the home meadow, dispersing by seepage over an area of mud and marsh extending 30 yards into the field. In wet weather surface water tended to accumulate in the yard and overflow into the neighbouring stackyard, as was the case on our first visit which took place during a period of heavy rain.

METHODS

Rectal swabs, faeces and sewage samples collected with sterile precautions, were inoculated into tetrathionate broth and after 24 hours' incubation at 37° C., were plated on bile-salts citrate agar (Difco SS agar). Non-lactose fermenting colonies were picked and identified using specific "O" and "H" Salmonella sera obtained from The Standards Laboratory for Serological Reagents, Colindale. After biochemical check tests, primary subcultures of all strains isolated were sent to the Salmonella Reference Laboratory for final identification and to the Central Enteric Reference Laboratory for *S. typhi-murium* Vi-phage typing. Direct plating methods were used when culturing from foetuses and foetal membranes and at the same time microscopical and cultural examinations were made for other organisms associated with abortion in bovines. For the agglutination tests, "H" and "O" antigens were prepared from the strain of *S. typhi-murium* isolated from the cows, using the methods described by Field (1948).

RESULTS

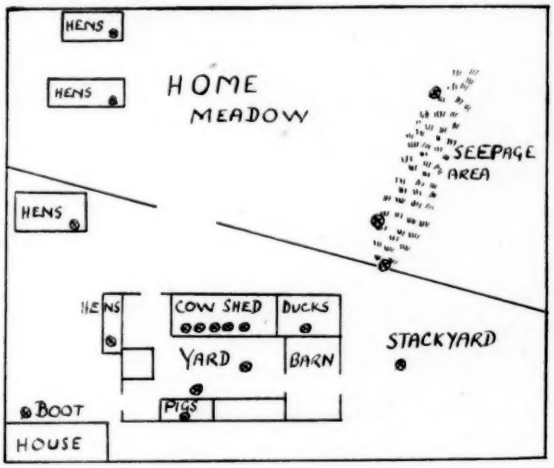
Cows.—Rectal swabs from all the cows were collected on three occasions at 10-day intervals during the month the herd was under observation. *S. typhi-murium* was isolated each time from the original sick cow, and once from the second aborting animal and three others.

Foetuses.—The foetus from the sick cow was obtained 24 hours after the act of abortion. Smears from the fourth stomach showed numerous gram-negative bacteria and *S. typhi-murium* was isolated in direct culture from the stomach contents and heart blood. No evidence of other organisms was found either in smears or cultures. Foetal membranes were not obtained but the organism was isolated from a vaginal swab (the possibility of faecal contamination during swabbing, however, cannot be excluded). Examination of the second foetus 72 hours after abortion gave identical results, and *S. typhi-murium* was also isolated in direct culture from a necrotic cotyledon removed intact from the uterus.

Other Animals.—Samples of freshly voided faeces were obtained from the pigs, hens and ducks, none of which showed symptoms of ill-health. *S. typhi-murium* was isolated from all these sources. No rodents were caught but as the outbreak occurred during harvest the farm buildings were relatively free of rats and mice.

Sewage.—Samples of solid and liquid sewage collected in the yard, stackyard and the field seepage area all yielded *S. typhi-murium*. The organism was also isolated from swabbings of the rubber boots worn by one of us (W. B. V. S.) taken on leaving the farm before personal disinfection.

The following plan of the farm premises shows sites of isolation of *S. typhi-murium*.



FARM BUILDINGS AND SURROUNDS

Sals. typhimurium Isolations

Blood Tests.—Tube agglutination tests were carried out on blood samples from all cows against "H" and "O" antigens using twofold dilutions commencing at a dilution of 1 : 10. The sick cow gave an "H" titre of 1 : 1,280 and an "O" titre of 1 : 640. The second aborting cow gave an "H" titre of 1 : 160 and an "O" titre of 1 : 80. None of the remaining cows gave titres of above 1 : 20 to either antigen.

Antigenic Structure.—All strains isolated had the following antigenic structure : "O" = IV, V, XII ; "H" = i — 1, 2, 3.

Vi-phage Typing.—Subcultures of strains isolated from the cows, the foetuses, the ducks, hens and pigs, the boot and the sewage all belonged to Vi-phage Type 1. The typing of *S. typhi-murium* by Vi-phage has been mentioned previously in a paper by Felix & Callow (1943), but the typing scheme at present in use at the Central Enteric Reference Laboratory has not yet been published (Felix & Callow, personal communication).

DISCUSSION

Felix (1951) has discussed the value and epidemiological significance of Vi-phage typing of *S. typhi-murium*. The fact that all strains isolated during the investigation belonged to the same Vi-phage type would indicate a common source of

infection. No decision regarding the source of infection was reached but various investigators in this and other countries have shown that many species of animals, including cattle, pigs and poultry, may act as symptomless carriers of *S. typhi-murium* (Topley & Wilson, 1946 ; Field, 1949 ; Josland, 1950 ; Williams-Smith & Buxton, 1951). On the farm there was no previous history of a similar outbreak of disease and the poultry were the only freshly introduced animals. As they were allowed to wander indiscriminately about the farm it is possible that they were responsible for the introduction and initial spread of the infection.

Summary

A clinical case of *S. typhi-murium* infection in a small herd of dairy cows was followed by abortion in two cows. The strains isolated from the cows and aborted foetuses, from the pigs, ducks and hens on the same premises and from liquid and solid sewage were of the same antigenic and Vi-phage type.

Acknowledgments.—Acknowledgments are due to Dr. Joan Taylor, of the Salmonella Reference Laboratory, for confirmatory typing and antigenic analysis, and to Dr. A. Felix, F.R.S., of the Central Enteric Reference Laboratory, for arranging for the Vi-phage typing of the cultures of *S. typhi-murium* isolated during the investigation.

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GUIDE DOGS FOR THE BLIND ASSOCIATION

Experimental Breeding Centre

The Guide Dogs for the Blind Association is an organisation the work of which, for several years now, has been commended by the B.V.A. to the interest and support of members of the veterinary profession, both centrally and locally. In its report for 1952, issued from headquarters at 81, Piccadilly, London, W.1, amongst much very readable and well-illustrated matter, indicating both useful work and urgent financial need, an interesting departure is described, which has as its object the selection of the right type of dog to make a satisfactory "guide." "Many breeds and crosses can be trained as guide dogs if they are large enough to provide the necessary 'balance' between dog and man. Labradors, Alsatians, Collies and Retrievers, and crosses of these, are the most numerous breeds used. It is not the breed, but the individual which matters, for the required temperament is not the monopoly of any one breed. This mistaken theory that Alsatians are 'dangerous' dies hard among the public. But the hundreds of these fine dogs which have successfully been trained as guides proves that the right type of Alsatian has no more vices than other breeds.

"At present the Association obtains most of its dogs at 12 months of age. Because three-quarters of the dogs tested at this age are found to be unsuitable, and have to be rejected, a small experimental breeding centre has been started in Cheshire. First crosses of the four main breeds used are being produced in an attempt to fix the qualities required in a guide dog. These include a reasonable degree of concentration, sensitivity and willingness to be taught. A too fearful or too aggressive dog, or one whose chasing instincts are pronounced, is unsuitable for training as a guide."

Despite the opening of a second training school (announced in the previous year's report) there is still a long waiting list of blind persons requiring trained dogs.

ABSTRACTS

Studies on Udder Evacuation in Dairy Cows*

I.—The following factors which may have an influence on the fat levels in the milk have been studied :—

1. The trend and size of the rise in fat percentage during milking and the cause of any variations that may occur.
2. The yield and average fat content of the milk.
3. The rate of milk flow.
4. Intramammary pressure.
5. Interval between milkings.
6. Comparison between front and rear quarters.
7. The effect of massaging the udder.

The theory that milk creams in the udder is unacceptable, as being mechanically impossible and physiologically unlikely. The theory that a considerable fraction of the milk is secreted during milking is also disposed of as being unlikely when it is realised that there is up to 20 per cent. of milk present in the udder which is not removed at any one milking. Serious consideration is given to the knowledge that the first fat globules are smaller than subsequent ones and the size of the latter therefore tends to retard progress, but that this phenomenon is of importance is not supported by the evidence presented in the paper. Attention is also drawn to the fact that fat secretion appears to be more rapid towards the end of milking and that the secretion curve bears some relation to the internal udder pressure curve.

The present work suggests that variation in milk yield is the main cause of variation in the rise of fat percentage during milking, and that intramammary pressure is only effective in so far as it is determined by the accumulation of milk in the udder. Known facts would seem to indicate that the fat globules are delayed in the alveoli or in their ducts during milk ejection. Whether there is also a physical delay within the secreting cell it is not yet possible to say.

The rise in fat percentage is somewhat higher for front quarters than rear quarters although milk yield, average butter-fat percentage, and intramammary pressure are highest for the rear quarters. Massage affects the rate of fat excretion; the more vigorous the massage the flatter is the curve of elimination, at least after the cow has passed the peak of her lactation.

II.—It now seems clear that milk secretion and udder evacuation are two definite phenomena. The former is a steady and uniform process not interfered with by the process of milking. The evacuation of milk, however, requires the co-operation of the cow. It was shown in 1927 that there was more milk in the udder at the beginning of milking than was removed by the milking process. This was confirmed by taking the average lactose content of excised udders.

In this study the authors have paid particular attention to the factors influencing the content of the residual milk. This was removed by the intravenous injection of 2·5 c.c. of Utedrin (corresponding approximately to 2·5 I.U. oxytocin) given five minutes after normal milking and stripping had been completed. Two minutes later the cows were milked by a machine and hand stripped. Some cows were subsequently given several injections at daily intervals following the first. This was done with the intention of observing how completely the udder could be evacuated. Even after the third injection there was still a small amount of fat remaining

* **Studies on Udder Evacuation in Dairy Cows. I.—The Rise in Fat Percentage during Milking ; II.—The Amount and Composition of the Residual Milk after Normal Milkings.** Johannson, Ivar. (1952). *Acta Agric. Scand.* **II.** 43–81 and 82–102.

in the udder. The other constituents of the milk withdrawn remain uniform in the first samples, but after repeated injections not only the fat but the protein, lactose and ash percentages decrease—the protein in particular. Oxytocin does not appear to have a harmful effect upon subsequent milk yield, but during the injections the udder is stimulated temporarily to take up more fat from the blood.

Studies on the progressive changes in fat content during normal udder evacuation indicate that the percentage rises slowly until about 80 per cent. of milk has been removed, and then rapidly during the last stages. In the residual milk obtained after the first injection, however, fat is liberated uniformly throughout. Repeated injections bring about a steady fall in the total amount for each successive milking, the concentration being of the order of that found in the strippings after normal milking. A subsidiary study was also made of the size of the fat globules at various stages of normal milking and in subsequent fractions following injection, in the hope that some light might be shed upon the mechanism of fat liberation in the milk. In a normal milking the size of the fat globules tends to rise as the process continues, *i.e.*, as the fat content increases. The fat in the first residuum after injection is similar to that in the foregoing strippings, but subsequently the percentage of smaller fat globules tends to increase.

The general observations from this work are as follows :—

The amount of residual milk usually varies between 10 and 20 per cent. of the total quantity present in the udder before a normal milking, but the residual fat content corresponds to anything between 20 and 50 per cent. of the total in the udder at the time of milking. The percentage of residual milk is influenced by the stage of lactation, the interval between milkings, the age and individuality of the cow. There is a lower absolute and relative amount of residual milk in young cows in their first lactation than in older animals, and the fat content of the residuum decreases with advancing lactation. When normal milking is resumed after treatment, the fat content is reduced by an amount corresponding to that which was contained in the residual milk, but returns to its normal level some 24 hours after the last injection. If, however, hand milking has been carried out after each extraction the milk may still be subnormal three or four days after the last treatment. The work supports the view that fat secretion is not subject to any appreciable variation during the lactation period.

N. S. B.

WORLD HEALTH ORGANISATION

Dr. M. G. Candau Nominated as Next Director-General

The WHO Executive Board, at its 11th session, nominated Dr. M. G. Candau, Assistant Director of the Pan American Sanitary Bureau (PASB), to succeed Dr. Brock Chisholm as Director-General of the Organisation. Dr. Chisholm's five-year contract will expire on July 21st, 1953, and he has refused the extension offered him by the Fifth World Health Assembly. Dr. Candau's name will be presented to the Sixth Health Assembly, which opens in May.

Dr. Candau has been with WHO since 1950: at Headquarters he held the posts of Director of the Division of Organisation of Public Health Services and, subsequently, of Assistant Director-General in charge of the Department of Advisory Services; he assumed his appointment with the PASB, which is also the WHO Regional Office for the Americas, in March, 1952.

REVIEW

[Clinical Pathology. By D. L. Coffin, v.m.d. (Third Edition.) Comstock Publishing Associates' Division of Cornell University Press, Ithaca, New York. Price $5.50.]

Previous editions of this book having appeared during the period of difficulty in publishing, have not been received for notice in our columns. The third edition now comes to hand, and it is with great pleasure that the reviewer welcomes the opportunity of introducing it to veterinary clinicians in this country who are not yet in possession of a copy.

To the best of the reviewer's knowledge there is no comparable book in the English language devoted to clinical pathology for the veterinary surgeon. It is no exaggeration to say that once having possessed a copy most veterinary clinicians wonder how they had previously managed without it.

In a short review it is not possible to present an adequate summary of the book's contents. Suffice it to say that every aspect of the subject is covered and that the keynote of the whole is practicability. The author does not expect every veterinary surgeon to have a fully equipped laboratory, but for those who have, the more elaborate techniques under each heading are described ; for the practitioner who has the usual side-room equipment simple tests are described and some indication of their value and accuracy is given.

Useful—and always practical—hints are given as to the selection, packing and despatch of specimens to laboratories —a section that will be welcomed by workers in diagnostic laboratories no less than by the practitioner. In all cases simple techniques are described for collecting or obtaining the tissue or material to be examined.

Many useful—and comprehensible—tables are given for quick differential diagnosis in each species. Illustrations are good, clear and adequately described in caption ; there are a few really excellent colour plates.

The chapters dealing with the blood have been re-written and fresh material added to bring the whole into line with modern thought.

Additional information is given in the section on leptospirosis and diagnostic methods available for infectious canine hepatitis have been included in the chapter on virus diseases.

A new and most valuable chapter has been added entitled " Diagnostic Interpretation in Clinical Chemistry " ; this title is self-explanatory but, in fact, this section also deals with the pathological physiology of various organs, an aspect of pathology which is receiving increasing attention.

It is possible to find some statements or values at which to quibble, but these are of little moment compared with the great assistance to be obtained from this work. Both large- and small-animal practice is catered for fully, with some attention to poultry and game birds, rabbits and laboratory animals. Needless to say, not all the information is applicable in this country but, on the other hand, little of importance here is omitted with the exception of tuberculosis, which receives scant notice.

It is pleasing to find the author quoting some British references, a feature often noticeable by its absence in American publications.

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Also received. **Application of Ultraviolet Radiation in Food Inspection.** [Trans. title]. By Dr. Vet. Zeke Tolgay, Ankara University, Turkey. Summary in English.

Errata: "Linton's Veterinary Hygiene." (Fourth Edition). We regret that the following mistakes were made in the title-description of this book, in the notice appearing in our issue of April 4th at page 221: (1) The date of publication is 1952, not 1953 as stated; (2) The initials of both authors are wrongly given. These should read N. J. (Scorgie) and C. A. (Willis), not A. N. and W. A., as printed.

QUESTIONS IN PARLIAMENT

Grey Squirrels (Bounty Scheme)

Mr. Bossom asked the Minister of Agriculture if he is aware that when a reward was offered in Canada recently for the delivery of tails of undesirable pests, men were caught cutting off the tails of live animals and then letting them go again, so that they could continue breeding; and if he will therefore consider requiring those asking the reward for killing grey squirrels to deliver the entire carcase and not only the tails.

Sir T. Dugdale: The importance of trapping squirrels in a humane manner has been stressed by the Forestry Commission in announcing the campaign, and reference to humane killing of trapped squirrels is made in the published leaflets. Further, it would be an offence under the Protection of Animals Act, 1911, to cut off the tail of a live squirrel. For these reasons I do not believe that the bounty scheme recently announced will have the effect feared, and I do not think the change suggested would be justified.

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National Agricultural Advisory Service

Mr. Alfort (April 2nd) asked the Minister of Agriculture to make a statement on the future of the National Agricultural Advisory Service and the prospects of restoring this link between this service and the university agricultural faculties.

The Parliamentary Secretary to the Ministry of Agriculture (Mr. G. R. H. Nugent): In view of the need to concentrate our energies on the production drive, my right hon. Friend is not at present proposing to make any change in the organisation of the National Agricultural Advisory Service.

Mr. Alfort: Does my hon. Friend realise that this change would restore the sense of confidence which the agricultural community have had in the National Advisory Service by feeling that it is an independent body and one to which farmers may go with the knowledge that they will get objective advice on the problems which affect them? Does not my hon. Friend think it important that this change should be undertaken in the near future?

Mr. Nugent: I cannot agree with my hon. Friend's premise that farmers have not confidence in the existing advisory service. My right hon. Friend has, however, set up a working party under my noble friend Lord Carrington to look into this general matter, and in due course we shall study the result in their report.

NOTES AND NEWS

Diary of Events

April 11th.—Meeting of the Biochemical Society, in Brussels (See Notice).

April 11th.—Annual Dinner of the B.R.X. Club, at the Royal Veterinary College, London, N.W.1.

April 13th.—British Agricultural History Society: First Conference at Reading (University).

April 16th.—Meeting of the Herts and Beds Division, B.V.A., at 70, Holywell Hill, St. Albans, 7.30 p.m.

April 17th.—General and Annual General Meetings of the Sussex Division, B.V.A., at Brighton (The Old Ship Hotel), 2.30 p.m. and 8 p.m. respectively.

April 25th.—30th Annual General Meeting of the Association of State Veterinary Officers, in the Auditorium of the Wellcome Foundation, 183-193, Euston Road, N.W.1, 2 p.m.

May 14th.—Laboratory Animals Bureau Symposium (on "Laboratory Animals") at the Royal Society of Medicine.

Aug. 9th—15th.—XVth International Veterinary Congress, Stockholm, Sweden.

Sept. 6th and 12th.—Seventy-first Annual General Meeting and Congress of the British Veterinary Association, at Aberdeen.

B.V.A. Committee and Council Meetings in Edinburgh

At the Royal (Dick) School of Veterinary Studies.

***Monday, April 20th.*—11 a.m. Organising Committee.**
2 p.m. Parliamentary and Public Relations Committee.
3.30 p.m. Home Appointments Committee.

***Tuesday, April 21st.*—10 a.m. Veterinary State Medicine Committee.**
12 noon Finance Sub-committee.
2.15 p.m. General Purposes and Finance Committee.

***Wednesday, April 22nd.*—11 a.m. Council meeting.**

R.C.V.S. Examinations

Wednesday, May 6th.—Animal Management Examination commences at London.

Thursday, May 7th.—Entries for D.V.S.M. Examination due.

Friday, May 8th.—Pharmacology, etc., Examination (Revised Syllabus)—Written Examination.

Monday, May 11th.—Pharmacology, etc. (Revised Syllabus), Orals and Practicals (London and Dublin).

Thursday, June 4th.—D.V.S.M. Written Examination commences at Edinburgh (2 p.m.).

Monday, June 8th.—D.V.S.M. Orals and Practicals.

Thursday, June 25th.—M.R.C.V.S. Written Examinations.

Friday, June 26th.—Ditto.

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PERSONAL

Progress of Professor George Wooldridge.—We are indeed pleased to be able to report that information obtained shortly before going to press with this issue indicates a considerable improvement in the condition of Professor Wooldridge, whose health has given rise to much anxiety since he was taken ill with pleurisy and congestion of the lungs some weeks ago. Telephone enquiries still should be made of Mrs. Reginald Wooldridge at Grimsdyke 1229.

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Appointment.—Mr. Elfed E. Jones, B.Sc., M.R.C.V.S., has been appointed Assistant in the Department of Surgery, Royal (Dick) School of Veterinary Studies, University of Edinburgh.

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Births.—Davis.—On March 12th, 1953, to Joan (Peggy), wife of H. Stanley Davies, M.R.C.V.S., 103, Bridport Road, Dorchester, Dorset, a daughter. A sister for Andrew and Jill.

Wright.—On April 1st, 1953, at Hythe, Kent, to Joan (*née* Whitehead) wife of James Wright, M.R.C.V.S., a daughter.

. . . .

Marriages.—Bennet—Mapley.—On March 14th, 1953, at the church of St. Peter and St. Paul, Shepton Mallet, Somerset, James Robert Bennet, M.R.C.V.S., of Bearsden, Glasgow, to Daphne Maureen Mapley, of Shepton Mallet.

Campbell—Caldwell.—On March 18th, 1953, at Laigh Kirk, Kilmarnock, by the Rev. D. P. Howie, M.A., Donald Campbell, M.R.C.V.S., elder son of Mr. and Mrs. Lachlan Campbell, Corrairigh, Cornaigbeg, Tiree, to Elizabeth Howie, youngest daughter of the late George Caldwell and of Mrs. Elizabeth Caldwell, Burnhouses, Kilmarnock.

Loftus—Wilson.—On March 17th, 1953, at St. John's Wood, London, Evelyn Esther Wilson to Anthony Cole Loftus, M.R.C.V.S.

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Ministry of Agriculture's Veterinary Field Staff: Changes in Personnel, Etc.—Mr. J. M. Fraser, M.R.C.V.S., D.V.S.M., transferred from Head Office to Fishguard on March 30th as Divisional Veterinary Officer in charge of the Port.

Mr. I. A. Graham, M.R.C.V.S., transferred from Hamilton to Glasgow on April 2nd as Divisional Veterinary Officer (on promotion) in charge of the Quarantine Station.

Mr. R. T. H. Massey, M.R.C.V.S., Divisional Veterinary Officer, transferred from Haverfordwest to Peterborough on April 8th.

Mr. F. P. MacLeod, M.R.C.V.S., was appointed to the permanent staff as Veterinary Officer on March 30th and is stationed at Leeds.

The Ministry's Divisional Office at Dumfries has been moved to Government Buildings, 161, Brooms Road, Dumfries (Tel.: Dumfries 2100), and the Divisional Office at Exeter has been moved to Government Buildings, Alphington, Exeter (Tel.: Exeter 56951).

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R.C.V.S. OBITUARY

Edwards, John Raymond, M.R.C.V.S., Veterinary Officer, Ministry of Agriculture, Belgrave, Spa Road, Llandrindod Wells, Radnorshire. Graduated Glasgow, December 12th, 1941. Died, after a short illness, at Tregonwell, Llandrindod Wells, on Good Friday, April 3rd, 1953; aged 36 years.

Mr. John R. Edwards was the son of the late Mr. Raymond Edwards and Mrs. E. M. Edwards, of Bury, Lancashire; deep sympathy in their bereavement is felt for her and for Mrs. P. Edwards (the widow) and the two children.

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THE LATE MR. RICHARD HEDLEY, M.R.C.V.S.

Mr. Richard Hedley, M.R.C.V.S., of Kingsbridge, South Devon, whose death we announced with deep regret in our issue of March 14th, practised for many years in the West of England. He came South in 1935, from Manchester, where his father, the late Richard Hedley, Senior, also was a very respected and esteemed veterinary surgeon.

A noteworthy tribute by " E. E. C." in the March 28th issue of *Horse and Hound*, includes the following: " Dick, as he was known to all his friends, was one of our finest sportsmen in the West of England, having owned horses which regularly ran at National Hunt and point-to-point meetings. He was a very familiar figure at all the N.H. meetings in the South of England, and was honorary veterinary surgeon at Newton Abbot and Buckfastleigh races, also at many of the West Country point-to-points. He was also honorary veterinary surgeon to the Dartmoor Foxhounds, South Pool Harriers, and Dart Vale and Haldon Harriers.

" The passing of this fine sportsman is an irreplaceable loss to all in the West Country."

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EASTER VAN HORSE PARADE

This year, as always, one of the biggest Easter Holiday attractions was the parade of van horses held in Regent's Park on Easter Monday. The entry was 279 singles, three pairs and three teams, *viz.*, 297 horses compared with 305 last year. This was considered by the London Van Horse Parade Society to be very satisfactory considering the difficulties with which owners and drivers have to contend in these days.

The Show was started in 1904, on the suggestion of the late Lord Woolavington, to encourage the owners and drivers of light van horses to take an intelligent interest in the care and well-being of their horses and ponies, and also in order that the public might show some appreciation of the time and hard work expended in keeping up a high standard of health and cleanliness. Each exhibit which reached a standard set by the judges and veterinary surgeons received a First Class Award, consisting of a cash prize, a red " Coronation " rosette and prize card, and a brass face-piece, from the Society and a Merit Badge from the R.S.P.C.A. In addition, the Hackney Horse Society made special awards for Hackney horses and ponies. This year, *Horse and Hound* presented the special Coronation rosettes as well as awarding Certificates of Merit to farriers of well-shod horses in good working condition.

The judging and veterinary examination started at 9.30 a.m., and the parade of winners and presentation of prizes by the President, Miss Gladys M. Yule, was held at noon, when she arrived on the Road Coach " Red Rover," owned and driven by Mr. Sanders Watney.

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INTERNATIONAL PONY BREEDERS' FEDERATION

Impressions of the Second Congress, Edinburgh, February 22nd to 28th, 1953

If one had been asked what struck one most at the Conference, I think the reply would have been, first, the complete sincerity of purpose, secondly, a fervid faith in the cause and thirdly the feeling of extreme urgency if action is not to be too late. It was remarkable to find so many delegates assembled together from widely scattered countries of Europe and even from all over the free world from as far as Canada, with the sole aim of trying to formulate some plan for saving the pure-bred native pony stocks from utter extinction.

The proceedings opened with a reception by Mr. McNair Snadden, Joint Under-Secretary of State for Scotland—himself a well-known agriculturist—who addressed the delegates. He pointed out that in Scotland alone, there are thousands of farms too small for the economical use of the tractor, on which the use of ponies would be the ideal. He quoted figures to show that during the last five years 400 Shetland ponies had been exported to the U.S.A. alone. This was followed by a civic reception in the City Chambers where an exhibition of Highland music and Highland dancing was given for the entertainment of the delegates, many of whom were ladies.

At the first business meeting the officials for the succeeding year were elected, the Earl of Dalkeith being unanimously chosen as President. It was felt that with so distinguished a President, so well known in Scottish agricultural circles, the work of the Federation is in secure hands. Following this, short papers were read by representatives of the Breed Societies of the nine breeds of British ponies. These—taken alphabetically—are: the Connemara pony, the Dales pony, the Dartmoor, the Exmoor, the Fell pony, the Highland, the New Forest, the Shetland and the Welsh. Each breed was described by a devotee and lover of the breed, and it would be as difficult as invidious to say which had pride of place. The Exmoor from a genetic point of view appears to be the true and only direct descendant of the original wild horse. Indeed, we were told that in 1946 the breed was well-nigh extinct, but thanks to the efforts of the Exmoor Pony Society assisted by Miss M. Etherington and Mr. J. G. Speed, working from the Royal " Dick " Veterinary College, a few pure remnants were discovered and the breed has been saved and let us hope that it will survive for all time. A series of most interesting films was shown depicting various breeds of ponies, both at work and in their semi-wild state. One of these which caused considerable interest was of the herd of Swedish Gottland Russ ponies, fending for themselves in the rough wooded country of the Swedish island of Gottland, and another film—in colour—was of the 80 or more Highland ponies being used for holiday trekking parties amongst the hills of Inverness-shire.

An outstanding paper was given by Mr. Gunnar Bjarnson, of Iceland, in which he showed conclusively the great value of ponies for agricultural work, pointing out that a farmer should buy and/or breed the horse of the lowest live weight which can do the work required on the farm, because the cost of rearing and feeding horses increases so much with the live weight. He indicated by figures, reduced into pounds of grain, the enormous economy in the food for ponies compared with that required for larger horses. At a time like this with the general food shortage all over the world, this important fact cannot be overlooked.

It was astonishing to learn what a strong position the Shetland pony holds in Holland to-day, where it is used for a multitude of purposes on the small holdings and market gardens of that country. An excellent description of its uses was given by Mr. Alsche, President of the Dutch Shetland Pony Society. It seems that about 1930, when dog transport in Holland became illegal, the Dutch people imported a number of Shetland ponies and these are now increasing, largely through the good efforts of their Society. Several other papers were given or read *in absentia* by members of continental breed societies, describing the merits of the various breeds, but these were too numerous to mention all individually in a short survey such as this.

Far and away the most interesting scientific paper was that read by Mr. J. G. Speed, of the Royal " Dick " School of Veterinary Studies, in which he described the researches done by himself and Miss M. Etherington on the origin of the Exmoor pony and its direct line of descent from the primeval horse. It is interesting to learn that the oldest known fossil of a horse dating back to from 30 to 70 million years was found near London, whilst other fossil horses of about 100,000 years ago were found to be virtually the same as the Exmoor pony of to-day. From the genetical and veterinary angle, Mr. Speed showed that when crossing took place, bone diseases, as evinced by the fossil remains, crept in—an unanswerable reason for the preservation of the purity of the breed. Only uncrossed pony breeds can survive unattended on open hills.

The Conference included a visit to the Scottish Zoological Park in Edinburgh to see a small herd of Exmoor ponies headed by the stallion Caractacus and a Pony Show at the Redford Barracks, where the British breeds of ponies were demonstrated in use for agriculture and also as riding and pack animals. From the social aspect one must mention the Congress dinner presided over by the Earl of Dalkeith; the Countess was also present and incidentally this was their first public appearance since their marriage.

At the final meeting of the delegates it was decided to nominate zone secretaries in many different countries with power to convene meetings in their areas—a most useful and important provision. As far as Great Britain is concerned, four such secretaries have been appointed: one each for Scotland, the North of England, Wales and for the South and West of England. Great stress was laid on the possibilities of increasing tourism by means of trekking on native ponies, both in this country and abroad. A special meeting was convened to try to find some means of protecting our ponies from the inroads of dealers, poachers and others interested only in their slaughter for human consumption—and presumably in the " black market "—no matter how valuable a pony might be for breeding or for agriculture.

Criticism has been heard to the effect that the increase of ponies would be detrimental to the breeding of horses and certain people have been antagonistic to the Federation on this account. In the writer's opinion there is plenty of room for both the horse and the pony, for while ponies manifestly are not suitable for heavy draught on certain large farms and for use on many types

of land, for the small holder and the hill farmer they would prove invaluable where tractors and heavy horses are uneconomical, and the pure strains of ponies would thus be available for crossing with larger horses for riding purposes. The Federation is far from being inimical to horse breeders and the sooner this "canard" is disposed of, the better will it be for all. The horse population has unfortunately now reached a low level—although there are signs of its decline being halted—and surely it would be better to keep our ponies in existence rather than risk losing all.

It was rather disappointing to find so few members of the veterinary profession attending the Congress. One realises how difficult it is for many veterinary surgeons to get away from their practices, but an interest in pony breeding and its protection is well worth while. The profession, especially in certain districts, could be second to none in furthering the aims of the Federation.

D. S. R.

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Constitution of the I.P.B.F.

It will be of interest to our readers to reproduce a few items from the constitution of the Federation.—

The I.P.B.F. shall be an international co-operation of pony-breeding societies and an international union of pony-breeders and pony-lovers with the purpose of furthering pony-breeding, the use of ponies in agriculture, industry and recreation, and for the preserving and protecting of native pony breeds.

The I.P.B.F. shall be available to give information to Ministries of Agriculture and to other institutions in all matters relating to pony-breeding and to the health and welfare of the pony breeds; issue information as to the use of ponies in agriculture, transport, industry and recreation; preserve and protect native breeds of ponies throughout the world; advance scientific research on pony-breeding and other pony questions; support the production of implements and vehicles suitable for ponies; support pony shows and special tests and competitions to prove the capabilities and efficiency of ponies; encourage the issuing of well-informed literature on ponies and especially reports in the Press; organise an archive and library of all matters concerning ponies; arrange and conduct parties to visit pony-breeding countries, and represent the interests and requirements of pony-breeding.

The I.P.B.F. shall consist of

Ordinary members: Pony-breeders or pony-lovers shall be accepted as ordinary members on payment of at least £1 sterling per annum.

Associate members: Members of pony breed societies or veterinary societies and other approved societies who wish to join the I.P.B.F. may do so through their breed society at an annual rate of 5s. sterling. The breed societies shall be responsible for the collection of these subscriptions which shall be paid to the zone secretary of the I.P.B.F.

Honorary members: Honorary members may be elected by the Committee for special services rendered to pony-breeding.

Membership fees: Membership fees should be paid to the secretary of each zone at the above rates. Fifty per cent. shall be kept by him for zonal work and 50 per cent. paid to the International Treasurer for international work.

The following zones shall be recognised: Argentina, Wales, North of England, South of England, Eire, Northern Ireland, Scotland, Sweden, Netherlands, Denmark, France (Pyrenees), France (Bouche du Rhone), Spain, Portugal, Malaya, Norway, Iceland, Yugoslavia, North Africa, Turkey, North Germany, Bavaria, South West Germany, Switzerland, Basutoland, Kenya, U.S.A., Canada, New Zealand, South Africa, Australia, Belgium.

Other countries not listed may be recognised at the discretion of the Committee.

* * * * *

Salmonella Infections in Man and Animals

In its issue of March 14th *The Lancet* reports that the Royal Society of Medicine's section of epidemiology and preventive medicine met on February 20th, under the chairmanship of Professor Robert Cruickshank, President of the section, to discuss the epidemiology of salmonella infections in man and animals, with special reference to *Salmonella dublin*.

Dr. Joan Taylor, discussing infection in man, said that salmonella infections were very common, the number reported having increased in recent years. This increase was only partly due to improved methods of collecting reports. Excluding the enteric organisms, *S. typhi-murium* was the commonest, accounting for almost 75 per cent. of the 5,094 cases in 1949-51. Endogenous types—those recognised in this country before 1939—caused about 92 per cent. of cases. The endogenous type of *S. dublin* was responsible for comparatively few cases—about 1 to 2 per cent. Irrespective of the type of infecting organism, each year the total number of patients in epidemics exceeded the number of sporadic cases. An analysis of patients' clinical histories in relation to type of infecting organism showed that with *S. typhi-murium*, *S. enteritidis*, *S. newport* and *S. thompson* the largest group of patients were ill for four to seven days, whereas with *S. dublin* the largest group were ill for over 17 days. In addition, the fatality-rate was higher for *S. dublin* than for the other organisms mentioned.

Mr. Reginald Lovell, D.Sc., M.R.C.V.S., discussing disease in animals, said there were three main groups of salmonella infections: those almost exclusive to man, those exclusive to animals, and those which attacked both man and animals. *S. dublin* was associated with cattle, and *S. thompson* with poultry; yet before the late war the only infections in poultry were *S. pullorum* and *S. gallinarum*. By contrast, in the U.S.A. poultry were then regarded as the main reservoir of infection. There was a high frequency of *S. dublin* infection in Wales, but not in other parts of the country. Dr. Lovell believed that the pattern of host-organism infections, and also the range of susceptibility to a given type, might change. Many diseases (for example, distemper and swine fever) that were now known to be caused by viruses had been attributed to salmonellae. In South Africa calves with both parasitic and *S. dublin* infections were more likely to die than if they had either infection alone. The effect of dual infections must always be borne in mind. In a *S. dublin* outbreak in a dairy herd in Wiltshire useful information was gained from the agglutinin titres of the cows' serum. The titre at which infection could be presumed to be present varied with the age of the animal.

Dr. A. M. McCall described his experiences in Somerset. Since 1947 there had been 14 outbreaks of *S. dublin* infection—three human, 10 bovine, and one among foxhounds. Of two human outbreaks in 1947 the first was at Bishopsworth, where 30 people were known, and 200 believed, to have been infected; and the second at Wadford, where 29 cases were reported. A third outbreak occurred in 1953 at Chard, where there were 600 known cases. This outbreak was notified by a headmaster; later the same morning it was found that 12 schools were involved. All general practitioners were notified. From an examination of school lists and a knowledge of the absentees it was evident that the outbreak was milk-borne. Tuberculin-tested milk was supplied from a single farm; the morning and evening milkings were pooled and transported to the dairy, where it was bottled and refrigerated. Of the daily production of 150 gallons, 90 were supplied to schools. A surprising finding was that among children taking milk the infection-rate was higher in a secondary than in an infants' school. The incubation period was 20 to 30 hours. The main symptoms were nausea, vomiting, fairly severe abdominal pain, severe frontal headache, and pronounced pallor. The temperatures varied from 99° to 105° F. There was very little diarrhoea, and most patients had recovered in four days. There were no deaths. The infection of the milk was traced to a sick cow with *S. dublin* infection of the udder. Subsequently three other cows were found to be infected; all were slaughtered. The origin of the cows' infection was not discovered. As a result of the outbreak more than 3,000 school days were lost. Only two adults reported ill.

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University of Liverpool Degree of B.V.Sc.

Following is the March, 1953, examination list of the University of Liverpool Faculty of Veterinary Science, for the Degree of B.V.Sc.:—

Ordinary Degree of B.V.Sc.

Adams, H. S.
Barbour, R. L. J.
Wakeem, A. A.

Degree of B.V.Sc.

Second Examination: Part III

Adams, D. V. M.
Bate, T. C.
Boyd, R. W.
Chandler, N.
Copley, J. D.
Dunwell, R. S.
Evans, R. K.
Featherstone, P.
Glaister, A. I. E.
Gleave, P.
Greenwood, J.
Hudson, G.
Lowe, A. D.
O'Malley, Mary C. B.
Potts, R. R.
Sanford, J.
Smith, M. W.
Stevenson, D. E.
Telesford, F. L.
Wallis, A. S., with Distinction
Walters, T. M. H.
Wheeler, A. J.
Wright, C. L.

Third Examination: Part I

Arnall, L.
Butcher, G.
Caldwell, B. A. W.
Edwards, D. B.
Haworth, E.
Hunt, G. C.
Kneen, J. E.
Shepherd, P. R.

HARRY STEELE-BODGER MEMORIAL FUND

Ninth List of Donations

The Appeal Committee again acknowledges with grateful thanks the following further donations to the Fund:—

	£	s.	d.
Total announced on March 28th	3,155	4	4
Mr. W. F. Aston (Shrewsbury)	10	10	0
Mr. P. J. Daly (Ballinrobe, Co. Mayo)	1	1	0
Mr. E. T. G. Donovan (Sutton Coldfield)	2	2	0
Mr. M. P. Geraghty (Dublin)	2	2	0
Mr. J. D. M. Jack (Khartoum)	1	0	0
Mr. W. W. Kirkby (Ahagabiki, Nigeria)	2	2	0
Mr. E. Marrison (Bakewell)	1	1	0
Mr. James Marshall (Barnsley)	2	2	0
Mr. D. L. O'Brien (Epsom)	5	0	0
Mr. John O'Driscoll (Kildare)	2	2	0
Dr. S. E. Piercy (Kabete, Kenya)	1	1	0
Mr. S. W. J. van Rensburg (Onderstepoort, Transvaal)	2	2	0
Mr. A. G. Robertson (Ellon)	1	1	0
Mr. B. R. Thompson (Abercorn, N. Rhodesia) ...	3	3	0
Mr. J. S. Watt (Windhoek, S.W. Africa)	2	2	0
West of Scotland Division	10	10	0
Total	£3,204	5	4

The subscription lists will close on April 30th, but in the case of organisations and societies not meeting before that date the Hon. Treasurer will be pleased to accept donations later.

Lists of future contributions received will be published in *The Veterinary Record* on April 25th and May 9th.

All donations should be sent to

S. L. Hignett,
Steele-Bodger Memorial Fund,
British Veterinary Association,
36, Gordon Square,
London, W.C.1.

Cheques, etc., should be made payable to the "Steele-Bodger Memorial Fund."

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

ANTHRAX:

Ches.—Dyers Farm, Edge, Malpas (Mar. 27); Moss Farm, Haughton, Tarporley (Mar. 28); Legh Oaks Farm, High Legh, Knutsford (Mar. 30).
Cumberland.—Field adjoining Main Street, Hensingham, Whitehaven (Mar. 31).
Derbys.—Royal Oak Farm, Ticknall (Mar. 31).
Hants.—Higher Farm, Linwood, Ringwood (Mar. 30).
Renfrews.—Darndaff Farm, Kilmacolm (Mar. 28).
Salop.—Upper Riddings Farm, Broseby (Mar. 27).
Staffs.—The Limes, Brockhurst Lane, Hints, Tamworth (Mar. 30).
Wigtowns.—South Boreland Farm, Dunragit, Stranraer (Mar. 31).
Yorks.—Spigot Lodge, Wensley, Leyburn; Widdington Manor, Nun Monkton (Mar. 30).

FOWL PEST:

Cambs.—Boons Farm, Langwood Fen, Chatteris (Mar. 31).
Herts.—Dog Kennel Farm, Lilley, Linton (Mar. 27).

SWINE FEVER:

Berks.—Elmhurst, Theale, Reading (Mar. 27).
Berwicks.—Slighouses, Chirnside, Duns (Mar. 26).
Cambs.—Houldens Farm, Gadds Lane, Leverington, Wisbech (Mar. 31).
Ches.—Hough Lane Farm, Comberbach, Northwich; Highfields, Goostrey, Crewe (Mar. 27); Park Farm, Shipbrook, Rudheath, Northwich (Mar. 30).
Cornwall.—B. Camp, Portreath, Redruth (Mar. 30); Poynters Lane End, Illogan, Redruth (Apr. 2).
Essex.—Rossdean Bungalow, Leaden Roding, Dunmow (Mar. 27); The Piggeries, Distillery Lane, Colchester; "Sunnyside," Rialbridge Chase, Romford (Mar. 28); Walcotts Meadow, Great Tey, Colchester (Mar. 30); 75, Englands Lane, Loughton; Marshfoot Piggeries, Chadwell St. Mary, Grays; 270, Pettits Lane North, Romford (Mar. 31); Kingstans Farm, Tye Common Road, Billericay; White House, Hullbridge Road, South Woodham Ferrars, Chelmsford (Apr. 2).
Flints.—Brunette Farm, Ty Broughton, Whitchurch (Mar. 30).
Glam.—Parc Hospital Farm, Bridgend (Mar. 30); Rhydd y Gleddyn, Brynna Road, Llanharen (Apr. 2).
Glos.— Back Lane Yard, Perry's Yard, Fairford; The Garden, Fairford; The Bakery, Lower Yorkley, Lydney (Mar. 27); Barn Ground, Fairford (Mar. 30); Thorn Farm, Yate, Bristol (Mar. 31); The Styes, Nedstop, Lydney; Chesham Cottage, Ruardean Hill, Drybrook; Elm Tree Farm, Little Haresfield, Stonehouse (Apr. 2).
Herefords.—Mount Pleasant, Tenbury Road, Near Bromyard (Mar. 26); Little Puckmore, Marcle Hill, Much Marcle, Ledbury (Mar. 30).
Herts.—Wheatsheaf Farm, Well End, Barnet (Mar. 31).
Kent.—Ringlands Stables, Hawley Corner, Westerham Hill, Westerham; Little Hungerden, Frittenden, Cranbrook (Mar. 27); Somerden Farm, Chiddingstone, Edenbridge; Worley's Wharf, Carisbroke Road, Friar Park, West Bromwich (Mar. 30).
Lincs.—Mile House, Heckington, Sleaford; Causeway House, Wyberton, Near Bolton (Mar. 26); Cliff Farm, Atterby, Bishop Norton (Mar. 28).
Middlesex.—Holland Bungalow, Moor Lane, Staines (Mar. 28).
Monts.—Llwyncoch, Llandrinio, Llanymynech (Apr. 2).
Norfolk.—41, Yong Lane, Brimston, King's Lynn (Mar. 30); Dixons Lane, West Walton, Wisbech (Apr. 2).
Salop.—"Orseddwen," Selattyn, Oswestry (Mar. 28); Small Heath Farm, Claverley, Wolverhampton (Mar. 30).
Staffs.—110, Rugeley Road, Boney Hay, Walsall; 110a, Longwood Road, Barr Common, Aldridge, Walsall; Wychnor Bridges, Wychnor, Burton-on-Trent (Mar. 31).
Suffolk—Hill Top Farm, Rattlesden, Bury St. Edmunds (Mar. 26); Oak Tree Farm, Norton, Bury St. Edmunds (Mar. 27); 1, Wattisford Road, Thelnetham, Diss; Vicarage Farm, Mendlesham, Stowmarket; Red Barn Farm, Rikinghall Inferior, Diss; Oaklands, Stanstead, Sudbury (Mar. 27); Builders Field Spring Lane, Bury St. Edmunds; Rushmere Hall, Rushmere, Lowestoft; Homefield, High Street, Kessingland, Lowestoft; Red House Farm, Stonham Aspal, Stowmarket; Brewery Farm, Stonham Parva, Stowmarket (Mar. 30); Mill Post Farm, Hawstead, Bury St. Edmunds (Mar. 31); Water Hill, Great Ashford, Bury St. Edmunds (Apr. 2).
Sussex.—Batchelor's Farm, Langney, Eastbourne (Mar. 30).
Warwicks.—Court Farm, Temple Grafton (Mar. 26).
Wilts.—The Mill, Marden, Devizes (Mar. 30).
Worcs.—Canada Lodge, Lower Cowsden, Upton Snodbury, Worcester; Timberdine Farm, Kempsey (Mar. 26); Spout Farm, West Hagley, Stowbridge (Mar. 27); 81 and 83, New Road, Rubery, Rednal, Birmingham; 220, Cooks Lane, Tile Cross, Birmingham (Mar. 30); 110, Upper Thomas Street, Aston, Birmingham, 6 (Mar. 31).
Yorks.—Fern Lea Piggeries, West Street, Lindley, Huddersfield; Piggeries, Barnsley Road, Hemsworth (Mar. 27); Brook House, Saltwick, Whitby; Little Weighton Road, Skidby, Cottingham; The Croft, Ouzlewell Green Lane, Lofthouse, Wakefield (Mar. 28); Whiteway Head Farm, Calcut, Knaresborough (Mar. 30); Kennel Farm, East Hardwick, Pontefract (Mar. 31); 604, Denby Dale Road, Calder Grove, Wakefield; The Queen's Head, Kirkburn, Driffield (Apr. 2).

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V.V.B.F. LADIES' GUILD

Northern Area Dinner and Dance

The first function organised in aid of the Victoria Veterinary Benevolent Fund by the Ladies' Guild, Northern Area, of which Mrs. Service of Ellon is secretary, was very successful both socially and financially. It took the form of a dinner and dance held in the Northern Hotel, Aberdeen, on Thursday, March 19th, 1953. The 120 guests, consisting of veterinary surgeons and their wives and friends, thoroughly enjoyed an excellent dinner, followed by dancing till 1 a.m. in the delightful ballroom of the Northern Hotel. As so many important events will take place in the Northern Hotel during congress week it is a happy augury that this social function was such an unqualified success, and that as a result of it the V.V.B.F. benefits by a donation of £75. £65 of this money was raised by a raffle, prizes for which were contributed by many friends of the profession and various firms manufacturing veterinary products.

HUMAN TUBERCULOSIS RESEARCH: BCG VACCINATION INVESTIGATION

In its March issue the *Chronicle of the World Health Organisation* reports that for nearly three years the WHO Tuberculosis Research Office (TRO), in co-operation with the International Tuberculosis Campaign and the Danish Statens Seruminstitut, has been conducting an investigation on BCG vaccine, a suspension of living but attenuated tubercle bacilli widely used to confer protection against tuberculosis. The BCG research programme was developed in response to the practical, everyday problems arising in the international mass BCG-vaccination campaigns, as well as in answer to the recognised need for more precise information about the vaccine itself: its variability from batch to batch, its keeping qualities, how it should be applied, how it is affected by physical agents such as heat and light, and many related questions. The results have been drawn together into a comprehensive report prepared by the TRO staff under the direction of Dr. Lydia B. Edwards and Dr. Carroll E. Palmer, with the assistance of Mr. Knut Magnus.*

More than 40,000 schoolchildren in Denmark, Egypt, India and Mexico were tested with tuberculin; some 23,000 considered eligible for vaccination on the basis of their reactions were given an intracutaneous injection of BCG. The vaccinated children comprised the study population, divided into nearly 300 groups according to some planned variation in the technique of vaccination or in the way the vaccine was prepared or treated before use. Tuberculin tests were then repeated, and the local lesions (or scars) resulting from vaccination were examined after two to three months, one year and two years.

These measured responses to vaccination, together with the results of the pre-vaccination testing, are given in tabular form in the appendices of the report, constituting a "source book" for the entire series of studies. Results drawn from the tables are presented and discussed in separate chapters according to subject: (1) scope, methods and material of the investigation; (2) pre-vaccination tuberculin sensitivity; (3) response to BCG vaccination; (4) effect of temperature and duration of storage on BCG vaccine; (5) effect of exposure of BCG vaccine to light; (6) variations in the technique of intracutaneous BCG vaccination; (7) variations in the preparation of BCG vaccine; (8) BCG vaccine from different production centres; (9) effect of diluting BCG vaccine, and the significance of dead organisms; and (10) general summary.

Though some of the material has been published previously, the present monograph is intended to give a comprehensive survey of the most significant results of the BCG-vaccine studies as at September, 1952. Some of the findings must be viewed as preliminary and the conclusions as tentative, pending further investigation, but many are based on studies repeated so frequently and with such consistent results as to warrant valid conclusions, even though often they are not in accord with prevalent views about BCG.

Inoculation of groups of schoolchildren with progressive dilutions of the same vaccine showed that reduction in the strength of vaccine is followed by a regular decrease in the average size of post-vaccination tuberculin reactions and vaccination lesions. But the decrease was much less than expected: the effect of halving or quartering the number of organisms injected was hardly detectable; and for some regular batches of vaccine the strength could be reduced several hundred times without impairing the result as measured by the percentage of vaccinated classifiable as "positive" reactors (according to criteria in general use to-day). It is evident that small variations in the amount of BCG injected have little practical importance so far as the level of tuberculin allergy in vaccinated children is concerned.

A series of studies was undertaken to determine the effect of variations in the technique of intracutaneous injection of vaccine. The intensity of post-vaccination allergy was found to be practically the same whether the vaccine was injected very superficially into skin, as is recommended, or into the subcutaneous tissues; nor was the allergy affected by variations in the volume injected, ranging from one-half to as much as three times the usual quantity of 0·1 ml. On the other hand, both the size and the severity of the local lesion at the site of vaccination were greatly influenced by the depth of injection: the deeper the injection, the larger the local lesion and the more frequent the formation of a local subcutaneous abscess.

The effect on BCG vaccine of exposure to light and heat was investigated in a number of separate studies. The results revealed that both light and heat reduce the potency of vaccine, but at a different rate. Kept at near-freezing temperature and protected from light, BCG vaccine loses its potency very slowly: the loss becomes measurable only after a period of months. By raising the storage temperature the rate of loss is increased: at 20° C. the loss of potency becomes detectable within weeks and, at higher temperatures, within days. A much more rapidly destructive effect is exercised by light: indirect daylight causes measurable loss of potency within a few hours, and direct sunlight in a matter of minutes or even seconds. These findings, though not basically new, indicate that vaccine must be protected from even short periods of exposure to high temperatures or to light to prevent the possibility of widespread use of vaccine which, though recently prepared, has already lost much of its potency to produce allergy. On the other hand, vaccines that produce a high degree of allergy when fresh may be expected to retain their effectiveness for up to two months if stored in a refrigerator at 2 to 4° C., or for about one month if kept in the dark at temperatures below 20° C.

Trials with vaccines containing varying proportions of living and dead BCG organisms gave some unexpected results. Vaccine composed entirely of dead organisms produced a low level of allergy, but the addition of only a small fraction of living organisms led to a surprisingly steep increase in potency. The effect of the dead organisms is apparently augmented by the presence of living BCG, or vice versa, so that, when combined, the two components produce stronger allergy than would be expected from the sum of the allergenic capacities of each used alone. These findings, together with those from studies on the effect of variations in intracutaneous-vaccination technique, suggest that even a vaccine containing a high proportion of dead organisms may produce "good strong takes" at the site of vaccination if injected deeply into the skin (or subcutaneously).

The results from the separate studies, taken as a whole, bring out some basic features about tuberculin sensitivity—the sensitivity induced by BCG as well as the naturally acquired kind found in unvaccinated schoolchildren. Like a recurring theme throughout the investigation, tuberculin sensitivity is shown to be appropriately described in terms of degree rather than as simply being present or absent, positive or negative. After vaccination, for example, the sizes of the tuberculin reactions of a group were generally found to be fairly closely concentrated: some reactions were smaller than the average and some larger, yet the population as a whole responded to vaccination with much the same degree of tuberculin sensitivity. The degree of sensitivity, in turn, depended upon the particular batch or strength of vaccine used. Some vaccines induced tuberculin sensitivity as high as that found from natural infection (and the same high degree of BCG-induced sensitivity was still present after two years). With other vaccines the group response was of a low degree. Irrespective of the degree of sensitivity, however, the vaccinated group nearly always responded in much the same way, and for this reason the average size of the post-vaccination reactions is shown to be a simple, useful way to describe results for a group of persons given the same vaccine, or to compare results with different vaccines. The more familiar method of noting the percentage of "positive" reactions gives far less information and may even obscure large differences in the degree of sensitivity induced by different vaccines.

Results of the tuberculin tests given to select children for vaccination—some 40,000 of them in four different countries—reveal that there are at least two different kinds of naturally acquired sensitivity. One kind, found everywhere, is seen as strong reactions to a weak dose of tuberculin. This high-grade sensitivity undoubtedly results from infection with virulent tubercle bacilli, and its frequency generally corresponds with the prevalence of tuberculosis in each area. The other kind, found only in some countries or in some areas within a country, is evidenced by smaller reactions to a weak dose and clearly differs from no sensitivity at all: persons showing low-grade sensitivity will, when tested with a strong dose, have a stronger reaction; non-sensitive persons fail to react whatever the dose. This low-grade kind of sensitivity was disclosed, as an important by-product of the BCG-vaccination programme, by studying the measured sizes of the tuberculin reactions and comparing the results from different areas where the tests and procedures had been done with uniform techniques. The fact of its existence, even though its cause is still unknown, necessarily introduces a new note of uncertainty into the interpretation of tuberculin reactions. This has a direct bearing on the validity of tuberculosis infection-rates based on results of tuberculin-testing surveys in some parts of the world; and it also raises practical problems in how to select persons to be given BCG and how to evaluate the results of mass-vaccination programmes.

* Edwards, L. B., Palmer, C. E., & Magnus, K. (1953). *BCG vaccination: studies by the WHO Tuberculosis Research Office, Copenhagen*, Geneva (*World Health Organisation: Monograph Series*, No. 12), 307 pages; price: 15s. Available in English.